2.0 BACKGROUND

2.1 INTRODUCTION

The Endangered Species Act (ESA), (16 USC 1531-1544), amended 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat upon which they depend. Section 7(a) of the ESA requires Federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and NMFS, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats.

Previous Section 7(a)(2) consultations are relevant as background for this current consultation. On March 2, 1995, NMFS issued a biological opinion entitled "Reinitiation of Consultation on the 1994-1998 Operation of the FCRPS and Juvenile Transportation Program in 1995 and Future Years," (hereafter referred to as the 1995 FCRPS Biological Opinion). In this opinion, NMFS determined that the operation of the FCRPS, as proposed by BPA, the Corps, and the BOR, would jeopardize the continued existence of threatened and endangered Snake River spring/summer chinook, fall chinook, and sockeye salmon and would adversely modify their critical habitat.

2.2 PREVIOUS BIOLOGICAL OPINIONS

The 1995 FCRPS Biological Opinion set out a reasonable and prudent alternative (RPA) for the operation and configuration of the hydrosystem to satisfy Section 7(a)(2) requirements. The RPA prescribed measures to increase the survival of juvenile and adult salmonids and initiated the development of a long-term system configuration plan. The opinion focused on three strategies:

1. Addressing scientific uncertainties through research and data analysis
2. Requiring immediate survival improvements in the mainstem corridor through increased voluntary spill, a flow augmentation program, transportation improvements, and other measures
3. Committing to a decision on which aggressive improvements, if any, would lead to the eventual survival and recovery of all (the 1995 FCRPS Biological Opinion considered only Snake River stocks) listed salmonids in the Columbia basin

The 1995 FCRPS Biological Opinion established a process to address the following information needs on the issues:

1. The survival of juvenile migrants in the river system
2. The effectiveness of juvenile transportation compared with inriver migration
3. The absolute return rates of transported and inriver juvenile migrants under different flow conditions
4. The effectiveness of new technologies such as surface collection

5. The cost, feasibility, and benefits of drawdown and other system alternatives

In the interim, the 1995 FCRPS Biological Opinion called for transporting all juvenile migrants collected and provided optimum inriver conditions for migrants that are not transported. The 1995 FCRPS Biological Opinion established a regional forum of Federal, State, and Tribal fish and wildlife managers to coordinate the day-to-day operations during the migration season.

On May 14, 1998, NMFS issued the "Supplemental Biological Opinion: Operation of the Federal Columbia River Power System Including the Smolt Monitoring Program and the Juvenile Fish Transportation Program: A Supplement to the Biological Opinion Signed on March 2, 1995, For the Same Projects (hereafter known as the "1998 Supplemental FCRPS Biological Opinion). This ESA Section 7 consultation evaluated the effects of the configuration and operations of the FCRPS on newly listed threatened and endangered steelhead in the Upper Columbia River UCR), Snake River (SR), and Lower Columbia River (LCR) Evolutionarily Significant Units (ESUs).

In the 1998 Supplemental FCRPS Biological Opinion, NMFS determined that operating the FCRPS in accordance with the Action Agencies' proposed action, including the measures specified in the 1995 RPA, would not jeopardize the continued existence of the newly listed steelhead. The 1998 Supplemental FCRPS Biological Opinion established spring flow objectives at Priest Rapids Dam to protect juvenile fish and expanded the spill program at many mainstem hydro projects, but otherwise left the decision-making process and timing for the long term as in the 1995 FCRPS Biological Opinion.

NMFS issued a second supplemental biological opinion entitled "Biological Opinion – Bureau of Reclamation Operations and Maintenance of its Projects in the Snake River Basin Above Lower Granite Dam: A Supplement to the Biological Opinions Signed on March 2, 1995, and May 14, 1998 (signed December 9, 1999)." This biological opinion on BOR operations was designed to evaluate and document BOR's planned operation to comply with the 1995 RPA measure related to the use of 427 kaf of upper Snake River water for flow augmentation. Again, the architecture of the long-term decision-making process was unaffected.

NMFS issued a last supplemental biological opinion on February 4, 2000, entitled "Supplemental Biological Opinion – Operation of the Federal Columbia River Power System Including the Juvenile Fish Transportation Program: A Supplement to the Biological Opinions Signed on March 2, 1995, and May 14, 1998, for the Same Projects." This opinion considered the effects of FCRPS operations on six species that NMFS listed as threatened or endangered in March 1999. NMFS determined that the 1995 RPA, as modified by the 1998 proposed action and combined with a few additional interim measures, would not jeopardize the continued existence of any of the newly listed species for the rest of the interim period. The decision-making process and timing for the long term, again, remained consistent with the 1995 FCRPS Biological Opinion.

2.3 DRAFT ENVIRONMENTAL IMPACT STATEMENT

The Corps issued a Draft Environmental Impact Statement (DEIS) describing alternative configurations and operations of the FCRPS in the lower Snake River for comment during December 1999. The DEIS was a requirement of the 1995 RPA.

2.4 CURRENT CONSULTATION

After issuing the DEIS, the Action Agencies reinitiated consultation on the long-term configuration of the hydrosystem by submitting their final "Multi-Species Biological Assessment of the Federal Columbia River Power System" (hereafter referred to as the "Action Agencies' Biological Assessment") to NMFS on December 21, 1999. NMFS engaged in consultation with the Action Agencies, in coordination with USFWS, and transmitted a draft biological opinion to these agencies on May 17, 2000 (letter from B. Brown [NMFS] to D. Ponganis [Corps], R. McKown [BOR], T. Lamb [BPA], and F. Olney [USFWS], M. L. Soscia [EPA], F. Disheroon [DOJ], and D. Mecham [DOI]).

2.5 FEDERAL REVIEW TEAMS FOR THIS CONSULTATION

2.5.1 The Biological Effects Team

The Biological Effects Team (BET) was charged with estimating the effects of current operations and potential future configurations and operations on the survival of listed juvenile outmigrants. NMFS used this information to analyze the listed species' biological requirements in the action area (Section 6.1.1), as well as at the species level (Section 6.1.2). The team included Federal biologists and engineers representing NMFS, the Corps, and BPA. NMFS Hydro Division staff then completed the biological effects analysis.

For juvenile fish using the mainstem Columbia and Snake rivers as a migration corridor, simulation modeling is the primary method used to evaluate the effects of the proposed action on the action area biological requirements. BET agreed to use NMFS' SIMPAS model, a fish passage accounting model that apportions the run to various passage routes (i.e., turbines, fish bypass system, sluiceway/surface bypass, spillway, and/or fish transportation) based on empirical data and input assumptions for fish passage parameters, to evaluate the biological benefits of juvenile salmonid passage measures.

BET reviewed and analyzed fish passage assumptions NMFS used in earlier fish passage modeling exercises, those developed in the PATH process, and the most recent empirical data to determine the fish passage parameters for input into the SIMPAS model. The team also used the latest compilation of fish passage information contained in the four white papers the Northwest Fisheries Science Center recently prepared on (a) "Passage of Juvenile and Adult Salmonids Past Columbia and Snake River Dams," (b) "Salmonid Travel Time and Survival Related to Flow in the Columbia River Basin," (c) "Predation on Salmonids Relative to the Federal Columbia River Power System," and (d) "Summary of Research Related to Transportation of Juvenile Anadromous Salmonids Around Snake and Columbia River Dams" (NMFS 2000 a, b, c, d).

BET reviewed spill and fish guidance efficiency, spill/gas caps, turbine, spillway, sluiceway, and bypass system survival, and diel passage patterns. The values of these parameters were quantified for each FCRPS dam and for both spring and fall chinook salmon (considered indicator species for the spring and summer passage seasons, respectively).

As a result of this collaborative analytical effort, on March 20, 2000, BET prepared and sent out a review draft BET report to the 13 Tribes and other regional fisheries comanagers. This draft report documented preliminary results of SIMPAS model runs incorporating current passage conditions (and alternative proposed future actions under consideration in the 2000 Section 7 consultation process). The assumptions and estimated dam passage survival rates used in this analysis are unchanged from the March 20 draft, pending receipt of comments on that draft together with comments on this draft Biological Opinion.

2.5.2 Hydroregulation (Modeling) Team

The Hydroregulation Modeling Team was formed by the Federal agencies during the Section 7 consultation process and charged with conducting hydroregulation modeling studies to simulate alternative river operations and the costs of such operations for the Columbia River hydrosystem. The team included Federal system analysts, engineers, and biologists representing NMFS, the Corps, BPA, BOR and USFWS. BPA assessed the effects and estimated costs of alternative future water management actions for both NMFS and USFWS biological opinion operations by using its HYDSIM hydroregulation model and a series of power market pricing and marketing models. The HYDSIM model simulates flow/reservoir management and fish spill operations on a monthly basis at FCRPS and other Columbia Basin projects to meet an array of purposes including flood control, anadromous and resident fish protection, projected energy loads, Columbia Basin Treaty obligations, and other project-specific non-power requirements. Model outputs include mean monthly discharge at various project locations including the NMFS flow measurement sites of Priest Rapids, McNary, Bonneville and Lower Granite dams, as well as end-of-month reservoir elevations for the major storage projects.

A large number of system hydroregulation studies of various operational alternatives were conducted and reviewed by the Hydroregulation Modeling Team before the Section 7 consultation team selected four modeling scenarios for review for the NMFS and USFWS biological opinions, including a base case study. The base case model study placed priority on meeting the reservoir operating provisions specified in NMFS' 1995 and 1998 Supplemental FCRPS Biological Opinions and the USFWS' 1995 Biological Opinion on Kootenay River sturgeon. Subsequent modeling scenarios evaluated the effects of including VARQ and modified flood control curves, deeper reservoir drafts at selected FCRPS projects, and increasing the Mica and/or Revelstoke projects' discharge during the summer period.

HYDSIM model output consisted of a monthly flow detail and a summary of the effect of project operations by enumerating the frequency with which the NMFS flow objectives are met on a monthly and seasonal basis at Lower Granite, Priest Rapids, McNary and Bonneville dams. The effect of the flow operations on the frequency of storage reservoirs achieving upper (flood control) rule curve elevation on April 10 and refill by June 30 was also summarized. See Section 9.7.1.3 for a detailed summary of hydroregulation modeling results. The power system cost estimates associated with these studies, when compared against the current (base case) operation, are still being developed and refined by BPA and are not available at this time.

2.5.3 Performance Standards Team

The Performance Standards Team was another team formed by the Federal agencies during the Section 7 consultation process. The team was composed of members from NMFS, USFWS, BPA, the Corps and BOR. It was charged with developing a set of performance measures and associated goals or standards that could be used by NMFS and the region to judge the success of the salmon recovery effort. The team began meeting in January 2000 and its work culminated in a draft report entitled, "Development of Provisional Performance Measures and Standards for Federal Hydrosystem Impacts in the Columbia River Basin," which was released to regional fishery agencies and tribes for review on March 24, 2000. In this paper, the team developed a process for formulating performance measures in the context of three major objectives:

1. It proposed a procedure for placing hydrosystem-related performance measures and standards in the context with performance measures and standards for other, non-hydrosystem actions affecting various life-history stages.
2. It developed a suite of provisional performance measures and standards applicable to hydrosystem-related actions, including performance measures for FCRPS hydrosystem activities and natural survival performance standards.
3. It developed a blueprint for revising the hydrosystem-related performance measures and standards in the context of mitigation measures using non-hydrosystem actions, i.e., as part of a comprehensive recovery planning effort addressing all Hs.

Subsequent to the release of this report, NMFS built on the efforts of this team in developing and selecting population-level measures of salmon survival and recovery for each species and hydrosystem performance measures, which are presented in Section 1.3.1.1.

2.5.4 Water Quality Team

The Water Quality Team was another team formed by the Federal agencies during the Section 7 consultation process. The team was composed of members from NMFS, USFWS, BPA, the Corps, BOR and EPA. It was charged with development of a water quality plan for the mainstem Columbia and Snake rivers. This team also began meeting in January 2000 and its efforts culminated in a paper entitled, "Development of a Water Quality Plan for the Columbia River Mainstem: A Federal Agency Proposal." It is included in this Biological Opinion as Appendix D.

The Water Quality Plan includes basinwide goals for total dissolved gas and water temperature in the Columbia River Basin. In its paper, the team outlined how a water quality plan could be developed and implemented in the Columbia Basin. A water quality planning process was also developed by the team to establish a decision process for both structural and operational water quality measures. The strategy of the water quality plan is to identify ongoing activities and planned-for improvements in fish survival that also serve to improve water quality by reducing total dissolved gas and water temperature. This team also addressed long-term structural, operational, and procedural measures for water quality improvements, as well as details concerning the process for development of a water quality plan, and are included in Appendix D.

2.6 MEETINGS WITH STATE AND TRIBAL REPRESENTATIVES

Beginning on February 2, 2000, NMFS held a series of meetings with the State and Tribal comanagers. The IT and the Columbia Basin Fish and Wildlife Authority (CBFWA) coordinated the meetings, which included affected agencies and Tribes that do not participate in the Regional Forum. NMFS also briefed the Northwest Power Planning Council and engaged in subsequent discussions with Council members. During those meetings, the co-managers and others commented on the technical elements of the proposed action and potential RPA measures.

NMFS invited consultation with the 13 Sovereign Tribes of the Columbia River basin in a letter from B. Brown. The letter, dated January 26, 2000, was faxed and mailed to each Tribal chairman. Copies were also transmitted to the Columbia River Intertribal Fish Commission, the Upper Columbia United Tribes, the Columbia Basin Fish and Wildlife Authority, and the Northwest Power Planning Council. In this letter, NMFS invited each tribe to participate in the ESA Section 7 consultation with the Action Agencies to develop the 2000 FCRPS Biological Opinion. The letter recognized that Tribal rights and Tribal trust resources could be affected by NMFS' findings and recommendations and actively solicited Tribal expertise in developing analyses of effects, biological requirements, and mitigation strategies for listed salmon and steelhead. NMFS also offered to meet individually with the Tribes on a government-to-government basis. In response to this invitation, NMFS met with the Burns Paiute, Coeur d'Alene, Colville Confederated, Kalispel, Kootenai, Confederated Salish & Kootenai, Nez Perce, Shoshone-Bannock, Shoshone-Pauite, Spokane, and Umatilla Tribes and the Yakama Nation and with representatives of the (UCUT) and the Columbia River Intertribal Fish Commission (CRITFC). Dates and locations of staff- and executive-level meetings are shown in Table 2-1 below:

Table 2-1. Consultation and Conferencing with the Columbia Basin Tribes on the FCRPS Biological Opinion

Location	Executive-Level	Staff-Level
Portland, Oregon	4/3/2000	1/13, 3/29, 4/7, 4/14, 4/17, and 6/7, 2000
Olympia, Washington	3/29/2000	--
Spokane, Washington	3/8 and 3/24/2000	2/9 and 3/16/2000
Orofino, Idaho	--	3/10/2000
Lewiston, Idaho	3/14/2000	--
Helena, Montana	--	2/25/2000
Washington, D.C.	1/24-25/2000	--

Representatives of nine northwest Indian Tribes and eight Federal government agencies met in a government-to-government consultation on Friday, March 24, 2000, in Spokane, Washington. The topics on the consultation agenda included a number of issues related to hydroelectric operations and fish and wildlife mitigation in the Columbia River basin, and Tribal concerns regarding the Federal Caucus' All-H Paper and related activities. Approximately 70 people attended the consultation.

The Tribes asked the Federal agencies to designate a lead agency for historic preservation and to explain how cultural resource issues would be addressed. The agencies agreed to develop a response and respond to the Tribes. The Corps took responsibility for getting an answer from the Federal agencies and relaying it to the Tribes before the All-H Paper was finished.

2.7 RELATED REGIONAL FORUMS

NMFS developed its biological opinion on the effects of FCRPS operations in coordination with other ongoing Federal and regional processes. The process is described in the following sections.

2.7.1 Federal Caucus/All-H Paper

The Federal Caucus includes NMFS, the Corps, BOR, BPA, EPA, BIA, the Bureau of Land Management (BLM), USFWS, and USFS. The primary role of the Federal Caucus has been to develop a comprehensive multi-species conceptual recovery plan that describes a range of potential Federal activities that could meet ESA obligations and rebuild Columbia basin stocks (All-H Paper). Non-Federal (Tribal, State, local, and private) activities are also considered in the All-H Paper to the extent that they can contribute to the recovery of ESA-listed species in the Columbia River basin. Recovery options are considered and analyzed across actions affecting each life stage of ESA-listed fish: habitat, hatcheries, harvest, and the hydropower system. These options are broadly described for the purpose of engaging a regional discussion.

After the draft All-H Paper was released, the Federal Caucus engaged in government-to-government consultations with 13 Native American Tribes in the Columbia River basin. In addition, more than 9,000 Pacific Northwest citizens testified in 15 public hearings. The Federal Caucus also received more than 60,000 written comments. Based on the feedback received during these processes, the Federal Caucus is attempting to balance and respect multiple competing interests, including the needs of anadromous and resident aquatic species, Tribal trust and treaty obligations, international commitments, and the economic and cultural concerns of all citizens within the region.

This paper attempts to balance these issues by recommending new, aggressive measures basinwide and across the salmon and steelhead lifecycle. It builds on existing measures for better balance and bolsters non-Federal decisions and actions with Federal support and funding. It recognizes the need to consider the broader cultural concerns of threatened and endangered species recovery. It links discrete actions across the ecosystem and the life stages of salmon and steelhead to provide biological and ecological connectivity on a basinwide scale. These actions will also benefit resident fish and other aquatic species.

The All-H Paper serves four major purposes. First, it provides an overall, conceptual recovery strategy encompassing threatened and endangered aquatic species affected by the FCRPS.

Second, the paper establishes a context for the new biological opinions on operation and configuration of Federal dams issued by NMFS and the USFWS. It shows how the actions called for in the hydrosystem fit in with other related recovery initiatives or ongoing policies in the Columbia River basin.

Third, the draft paper provided a tool for engaging and informing the general public about the issues affecting salmon and steelhead, resident fish and other aquatic species, and the policy choices under consideration in the effort to recover them. Fifteen public hearings and seven scientific workshops were conducted after the draft was released, representing an unprecedented opportunity for the public to participate in the formation of natural resource management policies.

Fourth, as a product of the Federal Caucus, it served as an organizing tool for the Federal agencies involved to align their programs and activities to ensure maximum coordination and policy uniformity from the Federal perspective.

The paper is not a decision document. Its content is neither regulatory, nor binding in nature. Rather, it presents a set of strategies, goals, and overall direction toward which the agencies in the Federal Caucus will commit to move their programs and policies (Table 2-1).

In making decisions to correct the decline of anadromous fish and steelhead, as well as other listed fish and wildlife resources, the Federal Caucus will comply fully with all applicable Federal laws and executive orders. These include, but are not limited to, the National Environmental Policy Act (NEPA), ESA, the Clean Water Act (CWA), and the National Historic Preservation

Act (NHPA), as well as trust responsibilities applicable to the unique and longstanding relationship between the U.S. government and the region's federally recognized Indian Tribes.

2.7.2 Plan for Analyzing and Testing Hypotheses (PATH)

PATH is a structured program of formulating and testing hypotheses involving the fundamental biological issues surrounding recovery of ESA-listed salmon and steelhead in the Columbia River basin. The PATH decision analysis focused on alternative hydrosystem actions that could be used to prevent the extinction and to aid in the recovery of Snake River spring/summer and fall chinook salmon. Much of the work of the PATH group formed the foundation of the life cycle analyses used in this Biological Opinion for these ESUs.

2.7.3 Cumulative Risk Initiative (CRI)

The CRI is a network of NMFS scientists working to synthesize information and provide clear, consistent, and scientifically rigorous decision support for salmonid conservation. The NMFS Northwest Fisheries Science Center's CRI process has used matrix modeling of salmonid population dynamics to evaluate extinction risks and the sensitivity of population growth for each ESU to changes in survival in specific life-history stages as a result of management actions. In this FCRPS Biological Opinion, the analysis was used to determine potential combinations of All-H strategies to achieve the biological objectives related to recovery of ESA-listed species.

In order to involve, obtain input from, and inform both the technical scientific community and the community of policy-makers, the Northwest Fisheries Science Center (NWFSC) established a series of workshops, with the audience of the workshops alternating between highly technical experts in specialized areas and a mix of policy and technical participants. Table 2-2 outlines the workshop schedule.

Table 2-2 Workshop Schedule

Date	Purpose	Level
Mar. 29, 2000	Cosponsored by American rivers	Technical and policy
Dec. 7-8, 1999	Spatial analyses	Technical
Oct. 27, 1999	Data-poor, rapid analysis assessments for other ESUs in the Columbia River system	Technical and policy
Sept. 29-30, 1999	Assessing the productivity of habitats with respect to salmon populations	Technical
Aug. 31, 1999	Putting the 4-Hs together	Technical and policy
Jul. 22-23, 1999	A technical introduction to the CRI analytical approach	Technical

2.7.4 NMFS White Papers

In October 1999, NMFS synthesized existing information on salmonid passage through the FCRPS in four white papers that discussed dam passage, transportation, flow/survival relationships, and predation, respectively. The papers also characterized uncertainties associated with existing data and the uncertainties raised in recent analyses by regional forums. The papers were released for regional review and comment.

Following regional review, the white papers were modified to reflect comments and information provided by numerous reviewers and resource agencies. Contributors include the Oregon Department of Fish and Wildlife, USFWS, Idaho Department of Fish and Game, Columbia Basin Fish and Wildlife Authority, Washington Department of Fish and Wildlife, Columbia River Inter-Tribal Fish Commission, U.S. Geological Survey, Fish Passage Center, Idaho Water Users Association, Inc. (IWUA), and IDACORP, Inc. The four modified papers are now available on the NWFSC home page (web site:www.nwfsc.noaa.gov/pubs/nwfscpubs.html).

2.7.5 Quantitative Analysis (QAR)

NMFS, in cooperation with other parties, is developing the QAR for the listed species that may be affected by the non-Federal, mid-Columbia projects (i.e., those operated by Douglas, Chelan, and Grant County public utility districts (PUDs). The QAR is a quantitative assessment of the biological requirements and likelihood of survival and recovery for endangered Upper Columbia River spring chinook salmon and endangered Upper Columbia River steelhead. As with PATH, much of the work of the QAR group forms the foundation of the life cycle analyses in this Biological Opinion for these ESUs.

2.7.6 Northwest Power Planning Council's Multispecies Framework Project/Ecosystem Diagnosis and Treatment (EDT) Analysis

The Northwest Power Planning Council's Multi-Species Framework Project is developing visions, strategies, and alternatives for recovering fish and wildlife resources in the Columbia River basin and analyzing the biological and social/human effects of alternatives. The Hydro Work Group of the Federal Caucus and the Framework staff jointly evaluated alternative measures for system configuration and operations and agreed to the specifications of these measures in seven Framework Project alternatives and three Federal scenarios. The joint group also coordinated the analysis of hydrosystem operations, the biological studies and evaluations, and other Federal and Framework Project tasks related to the hydrosystem.

The Framework Project will characterize a set of alternative futures for the Columbia River basin that focus on a long-term vision for the region. The Framework Project uses an analytical technique called EDT to compare the ecological effects of various alternatives and describe their economic, social, and cultural impacts. The analysis focuses on long-term conditions and emphasizes habitat actions.